PSC of WISCONSIN

Public Service Commission of Wisconsin Office of Energy Innovation
Critical Infrastructure Microgrid and Community Resilience Center Pilot Grant Program

OEI Wisconsin Office of Energy Innovation

ATTACHMENT A - COVER SHEET

SECTION I - Provide information summarizing the project proposal.				
Project Title:	Telelift Critical Infrastrucutre Resiliency Pilot			
PSC Grant Request ($):	**Applicant Cost Share ($):**	**Project Total ($):**		
100,000	200,000	300,000		
Choose one Eligible Activity				
☐ Critical Infrastructure Microgrid Feasibility Study Level 1 and 2	☐ Critical Infrastructure Microgrid Feasibility Study Level 3	☒ Community Resilience Center Feasibility Study		
SECTION II - Provide information for your organization, signatory, and primary contact for the project.				
Applicant Type:	☐ City	☐ Village	☐ Town	☒ County
☐ Tribal Nation	☐ Wisconsin Technical College System			
☐ University of Wisconsin System	☐ K-12 School District	☒ 501(c)(3) nonprofit		
☐ Municipal Utility (water, wastewater, electric, naturalgas)		☐ Hospital (public or nonprofit)		
Name (on W-9):	Millenium Economic Development Corp.			
Address (on W-9):	P. O. Box 96, Crandon, WI 54520			
County or Counties Served by Project:	Forest			
DUNS Number or CAGE Code:	828657200			
NAICS Code:	926110			
Authorized Representative/Signatory (Person authorized to submit applications and sign contracts)		**Primary Contact** (if different from Authorized Representative)		
Name:	Mark Ferris	**Name:**		
Title:	Executive Director	**Title:**		
Phone:	920-858-3193	**Phone:**		
E-mail:	FCEDP.US@gmail.com	**E-mail:**		
Signature of the Authorized Representative	Mark C Ferris			

Millenium Development Corp (FCEDP)
Telelift Critical Infrastructure Resiliency Program

Summary of Project Budget				
Line	**Description**	**PSC Grant Request**	**Applicant Cost Share**	**Total Project Cost**
1	Personnel			$0
2	Fringe			$0
3	Equipment			$0
4	Supplies			$0
5	Travel			$0
6	Contractual	$70,000		$70,000
7	Other	$20,000	$200,000	$220,000
8	Indirect	$10,000		$10,000
	Totals	$100,000	$200,000	$300,000
	% of Total	**33%**	**67%**	

Applicant Comments: Contract to perform hybrid system build, data collection and analysis. Wisconsin Telelift has a federal sole source via SBIR, with previously negotiated reimbursement rates with WEDC. OTHER- Reimbursement for expenses related to building the hybrid telelift system for data collection and operational deployment purposes. INDIRECT- de minimis 10%

3.1. Application Cover Sheet (Attachment A)

3.2. Application Budget Sheet (Attachment B)

Project Description

The Telelift Critical Infrastructure Resiliency Pilot is a feasibility study on alternative energy supplies for dynamic networks. Dynamic networks provide 4G/5G/LTE and/or WiFI networks during emergency and disaster response. Wisconsin Telelift (WiscLift) and Forest County Economic Development Partnership support Forest County Emergency Management directly and the state emergency management through the BEOC. WiscLift currently deploys a heavy rescue truck providing network connectivity and power supply for contingency operations. This pilot will review the capability of battery storage for dynamic network trailers and vehicles, as well as a PV charging and storage capability in Forest County.

As dynamic networks roll-out to counties, municipalities, National Guard, and other emergency responders across the nation, an opportunity to incorporate clean power supply is upon us. Dynamic networks have proven generator power capability, but do not harness all of the power available during operation. By incorporating a battery storage option, power optimization can be achieved, with generators only operating to charge storage cells upon depletion.

Telelift operations have provided critical networks during hurricane and wildfires in 2020. The WiscLift approach in 2021 has added power and network offerings for National Guard Exercise Patriot and recent (July) storm response in the Northwoods of Wisconsin. The WiscLift heavy rescue vehicle has served as a stand-alone Mobile Command Center, powered National Guard security force's Tactical Operations Centers, and simultaneously provided 4G/LTE networks to survivors and first responders. Telelift operations support state emergency operations, deployable to support all Wisconsin residents. Additionally, telelift is under SBIR contract with USAF Research Lab and has requests from New Jersey State Police and Hawaii Department of Commerce. Multiple projects are in negotiation to begin roll-out, where alternative power solutions can be incorporated.

Critical Infrastructure

Telelift stand-alone mobile dynamic networks are critical communication networks during emergency and disaster response. The systems have also provided 110/220V AC power to support charging stations, operations centers, etc. By incorporating battery storage capacity, telelift trailers/vehicles will be become not only mobile networks but also mobile power supplies. Already deigned for rapid response and deployment to critical locations, this program would bring significant power resources to any critical location in Wisconsin and beyond.

WiscLift heavy rescue currently deploys a 6.5 KVA gas powered generator for drone and network power. The large surge requirement of the drone requires a 6.0 KVA power source during rapid acceleration, but rarely utilizes over 50% of the minimum power supply. This untapped power loss can be avoided by inserting battery storage as a buffer, allowing the vehicle to power multiple requirements without concern of under-powering the drone during a surge

maneuver. Additionally, the battery storage can be charged and maintained by alternative green fuel sources during non-deployed times. The heavy rescue vehicle has a large gross weight capacity and customizable storage options which are being underutilized. Telelift trailers have a smaller footprint and will offer less weight and storage capacity, but again prove underutilized. The feasibility study will assess optimal battery, charging, and capacities for both vehicles and trailer versions of telelift systems.

This project is by definition a Community Resilience Center function, with mobile service to multiple sites making it Level 3.

Key Partners and Stakeholders

Forest County Economic Development Partnership (FCEDP) – As applicant, FCEDP will oversee and manage this program, interface with local government including Forest County, Forest County Potawatomi Community, Chippewa Sokaogon, cities, and townships. FCEDP will contract Wisconsin Telelift to perform the technical aspects of the feasibility study using approved rates from previous WEDC Forest County Capacity Building Grant and Federal Sole Source contracts. FCEDP will perform this function for a 10% indirect de minimis fee.

Wisconsin Telelift Inc. (WiscLift) – WiscLift will provide technical insight, preparing electrical usage, capacity, schematics and capability studies as part of the feasibility report. WiscLift will provide use of its heavy rescue vehicle, telelift systems, and networking equipment valued at over $200,000 as an in-kind contribution to this program. During the course of this program, WiscLift will utilize real-world deployments and trade secret information to formulate metrics and deliverable data for measurement/assessment. WiscLift was selected as a finalist for the Wisconsin Innovation Award (awarded 05 Oct 2021) and was winner of the WEDC We're All In(novating) 2020 awards.

Forest County – Forest County has an established working relationship with FCEDP and WiscLift. This includes multiple efforts to secure dynamic networks for Forest County, Forest County Potawatomi, and Chippewa Sokaogon. The Forest County Emergency Management Director works in direct coordination with FCEDP and WiscLift.

Tribal Nations – In addition to aforementioned tribal efforts, demonstrations of telelift systems for the Lac du Flambeau Board are scheduled for August. Requests from Oneida Technology and Four Corners (tribal conglomeration) continue to be addressed for opportunities going forward.

Wisconsin Agencies – FCEDP and WiscLift have/continue to work with numerous Wisconsin agencies including WEDC, Dept. of Public Instruction, WI Center for Technology Commercialization, University of Wisconsin-Extension, Wisconsin Emergency Management and the Wisconsin National Guard.

This program extends to all Wisconsin residents, businesses, and public entitiess as required. As such, prioritization to serve those in need including disadvantaged communities is available.

Forest County, as the hub of telelift technologies includes a HUBZone, is widely considered an economically distressed region, and is home to two tribal nations.

Project Resilience Objectives and Metrics

This project will directly address resiliency by reviewing how telelift stand-alone systems can preserve temporary operations until critical customers like hospitals, water and sanitation systems, first responders, communications towers, and food storage is restored. Upon restoration of these critical users, a review of the ability to provide power and network connectivity to public entities will be assessed.

Objective 1. Assess the equipment needed to power stand-alone systems in a hybrid power model. By incorporating battery storage, dynamic networks will continue to provide critical communication networks, while simultaneously powering additional critical equipment. Telelift systems currently have gas-powered generators with excess capacity untapped, allowing battery storage to capture all available the power when generation is performed.

Objective 2. Design a battery storage system for operating telelift systems for extended periods without generation. A measurement of optimal storage for trailer systems, vehicle systems, and mobile command center systems will be provided. Factors will include space available, weight available, and cost of storage capacity versus expected power requirements to design optimal equipment designs. Expectations will be to provide a minimum of a four (4) hour battery operation for small trailers, with a targeted twenty-four (24) hour battery operation for mobile command centers.

Objective 3. Incorporate a PV system design for charging stand-alone telelift system batteries prior to deployment. FCEDP has a proposed Forest County Innovation Park project underway, with a site determined in Hiles. This objective will evaluate the PV opportunities, battery storage capacity, and equipment design for making a home station charging station for non-deployed systems.

Objective 4. Build and deploy a prototype hybrid power station as a proof-of-concept. Utilizing WiscLift's heavy rescue truck with gas generator, incorporate a battery storage/supply system. Measure the battery capacity in kW, telelift system operations hours, and ability to generate power via gas generator or PV while simultaneously operating the system. Additional measurements will include power available for external needs (critical facilities, public charging, etc.) while safely operating telelift.

Site Specifics

This project is not site specific, as most of the study is based on mobile battery storage. However, Objective 3. will include a PV system design and will include the Forest County Innovation Park proposed site in Hiles. The feasibility study will cover all required permits, covenants, and all other impacts expected. This study will include a thorough review of PV generation, storage on site, and charging to dynamic network battery systems.

The majority of the study will incorporate system designs utilizing existing WiscLift equipment. This will include a heavy rescue vehicle with on-board gas-powered generator. Designs for a trailer-based system will be provided. All work will be compliant with Department of

Transportation, local and state laws. The study will review all components to determine the recommended system design to incorporate shore power, PV, and on-board generator charging to the battery storage.

Technology Considerations

Mobile dynamic networks require a 220V 30-amp circuit for continued operation. A stand-alone system requires a generator power supply of 6kVa minimum, to provide safety margin for short burst accelerations of the aircraft. This study allows the high surge requirement to be negated, focusing on long-use consumption (over 4 hours) and support to other critical equipment.

Battery Storage: A review of electric vehicle technology, including cost of new and used batteries will be performed. Utilizing batteries which are DOT compliant/certified allows the study to focus on operational feasibility.

Generators: Stand-alone dynamic networks currently utilize commercially available generators to operate. The gas-powered 6.5 kVA generator on the WiscLift truck uses between 0.5 – 1.0 gallons per hour, with a moderate noise emission. Battery storage will have a major effect on the type and size of generator required, which will be reviewed for emissions, noise, consumption, and financial cost.

PV System: The PV system design will be based on capacity and output rather than specific brands or equipment. Considerations for cost per kilowatt, storage, grid intertie, and charging station design will be included. Financial models will be reviewed with recommendations on a system based on the capacity of storage, power generation including grid intertie, and ease of use.

Dynamic Networks: WiscLift will provide their heavy rescue vehicle for the purposes of this study. This vehicle has a proven system including an operational telelift UAV, a Honda water-cooled 6.5 kVa generator integrated, an AC electrical panel with numerous 110/220V plugs, available storage bins, and ample gross weight capacity available.

In order to be a success, the proper connections to make hybrid systems which can simultaneously, provide AC power for critical equipment, power to operate the dynamic network, and charge battery storage via PV/generator power. This will require a complete system with an emphasis on connections, converters, and safety design.

Cost Match

FCEDP and WiscLift have agreed that an in-kind cost match will be provided. WiscLift will provide use of its heavy rescue truck and complete telelift dynamic network. The value of this equipment exceeds $200,000 and is vital to establishing data on actual power requirements and storage capacity needs.

The likelihood of this project moving forward without funding is low. In order to evaluate consumption, a battery system is required to measure real-world usage. Inefficiencies in generation, large surge requirements, and safety of flight require a battery buffer to accurately understand power needs versus availability to operate an optimal power system. Unfortunately,

over-generate and under-utilize are safety factors which cause inefficient use of power, increased fuel usage, and additional emissions.

Data Collection Plan
Utilizing the battery storage system built in this study, a series of tests can be performed to accurately measure consumption over a four (4) plus hour dynamic network operation. Power available for additional equipment can then be calculated, as well as the alternate power configurations while utilizing battery and generator power simultaneously. The data gained from these collections will directly impact design of future systems and long-term use of dynamic networks and their ability to provide additional mobile emergency power.

System Sizing Analysis
The data collection plan, combined with a complete review of space and weight limitations will provide the basis of a system sizing analysis. Once sizing selections are made for mobile vehicle and trailer configuration, the sizing analysis for a PV charging system and storage can be performed. A balance between cost, size, and weight versus endurance and power availability will be targeted.

Financial Analysis
The concept of dynamic networks for emergency response and resiliency is an emerging industry. FCEDP is working with local, state, and federal government agencies as well as private industry to grow Forest County as a hub for a potentially multi-billion-dollar market. The Critical Infrastructure and Community Resilience piece adds a valuable opportunity that can be incorporated into a model for duplication across the nation. A hybrid dynamic network stand-alone system with the ability to power additional equipment can be manufactured in Forest County, with unit sales exceeding 5000 units. This would provide job opportunities and large tax-revenue avenues for a depressed economy in the Northwoods of Wisconsin. This project is a small building block in Forest County's approach to innovation and economic development.

Environmental Impact
The estimated average usage of telelift dynamic networks is less than 30-percent of the required surge protection requirement. By incorporating a battery storage system, gas generation requirements will be greatly reduced to times only when required. When gas generation is required, all energy will be captured reducing the inefficiencies of power safety margins currently being utilized. As the number of dynamic network deployments increase, the environmental impact will be exponential.